Name: _____

Multiplying Binomials
(Converting from Factored Form to Standard Form)

A binomial is a 2-term polynomial (meaning there are 2 numbers or numbers with variables that are being added together). To multiply a binomial with another binomial, you must distribute twice. First, you distribute binomial 1 (as a whole group) to both parts inside binomial 2, then you distribute the parts of binomial 2 to both parts in binomial 1. There are shortcut methods that help you to do this more quickly (FOIL, the area model), but, today, we are breaking down the process to understand what is actually happening when you multiply binomials. We will start with factored form when $a = 1$.

$1(x - r_1)(x - r_2)$	**EXAMPLE** $(x - 2)(x + 3)$	1. $(x + 5)(x - 1)$	2. $(x - 12)(x - 2)$
Distribute 1st group	$x(x - 2) + 3(x - 2)$		
Distribute into each group & simplify to $1x^2 + b_1x + b_2x + c$	$(x)(x) - 2(x) + 3(x) + 3(-2)$ $x^2 - 2x + 3x - 6$ $(b_1)(b_2) = (-2)(3) = -6$ $b_1 + b_2 = (-2) + (3) = 1$	$(b_1)(b_2) =$ $b_1 + b_2 =$	$(b_1)(b_2) =$ $b_1 + b_2 =$
Simplify to $1x^2 + bx + c$	$\boxed{x^2 + x - 6}$ $(a)(c) = (1)(-6) = -6$ $b = 1$	$(a)(c) =$ $b =$	$(a)(c) =$ $b =$

$1(x - r_1)(x - r_2)$	3. $(x - 3)(x - 9)$	4. $(x - 11)(x + 3)$	5. $(x + 10)(x + 2)$
Distribute 1st group			
Distribute into each group & simplify to $1x^2 + b_1x + b_2x + c$	$(b_1)(b_2) =$ $b_1 + b_2 =$	$(b_1)(b_2) =$ $b_1 + b_2 =$	$(b_1)(b_2) =$ $b_1 + b_2 =$
Simplify to $1x^2 + bx + c$	$(a)(c) =$ $b =$	$(a)(c) =$ $b =$	$(a)(c) =$ $b =$

We are going to continue practicing multiplying binomials with a modified version of factored form, before practicing with the correct and complete factored form.

$(ax - r_1)(x - r_2)$ or $(x - r_1)(ax - r_2)$	6. $(3x - 5)(x + 4)$	7. $(x + 3)(2x - 7)$	8. $(4x - 5)(x + 4)$
Distribute 1st group			
Distribute into each group & simplify to $ax^2 + b_1x + b_2x + c$	$(b_1)(b_2) =$ $b_1 + b_2 =$	$(b_1)(b_2) =$ $b_1 + b_2 =$	$(b_1)(b_2) =$ $b_1 + b_2 =$
Simplify to $ax^2 + bx + c$	$(a)(c) =$ $b =$	$(a)(c) =$ $b =$	$(a)(c) =$ $b =$

$a(x - r_1)(x - r_2)$	**EXAMPLE** $-5(x - 2)(x + 3)$	9. $3(x + 5)(x - 1)$	10. $-(x - 12)(x - 2)$
Distribute 1st group	$-5[x(x - 2) + 3(x - 2)]$		
Distribute into each group & simplify to $a[x^2 + b_1x + b_2x + c]$	$-5[(x)(x) - 2(x) + (x)(3) - 2(3)]$ $-5[x^2 - 2x + 3x - 6]$		
Simplify $b_1x + b_2x$	$-5[x^2 + 1x - 6]$		
Distribute a $ax^2 + bx + c$	$\boxed{-5x^2 - 5x + 30}$		

$a(x - r_1)(x - r_2)$	11. $-2(x - 3)(x - 9)$	12. $4(x - 11)(x + 3)$	13. $-3(x + 10)(x + 2)$
Distribute 1st group			
Distribute into each group & simplify to $ax^2 + b_1x + b_2x + c$			
Simplify $b_1x + b_2x$			
Distribute a $ax^2 + bx + c$			